Climate Change Adaptation

Ruin near Temple Mountain, Utah.
Photo by Lydia Loopesko, 2022

What is the problem?

Remains of the Yungay Cathedral, which was destroyed by a catastrophic landslide. Photo from Wikimedia Commons.

Adaptation aims to minimise the adverse consequences of climate change and maximise the opportunities it presents. Adaptation actions can include behavioural, institutional, and technological adjustments.

The selection and implementation of adaptation measures will require the integration of significance assessments for all types of heritage with an understanding of climate change risks and a commitment to low carbon, sustainable and inclusive solutions.

Adaptation activities are likely to require additional resourcing, however, knowledge, understanding and the provision of sectoral leadership are possibly more crucial in the early stage of the process. It is important to understand the adaptive capacity of a place, community or system, in terms of potential, resources and other needs in order to make successful decisions and interventions.

Actions to actively adapt to climate change need to be combined with strategies to increase resilience. Resilience is the ability of a community or a system to cope with disasters, trends or disturbances and to 'build back better'. Increasing resilience in advance of expected climate change impacts can potentially reduce the need for adaptation in the future.

In this Toolkit the word 'Mitigation' refers exclusively to preventing, reducing or capturing greenhouse gases. The sooner we can curb emissions via mitigation, the more manageable the challenge of Climate Change will be – and the more likely local and site-based adaptation efforts are to succeed. Mitigation and adaptation are therefore closely linked, and are often referred to together as 'Climate Action'.

Why does it matter?

Students undertaking climate vulnerability assessment during Smart Conservation 2.0 workshop in Chennai India 2019. Photo by C. Daly

Climate change has become one of the most significant and fastest growing threats to people and their cultural heritage worldwide. Scientific evidence shows that unprecedented concentrations of greenhouse gases (GHGs), driven by human activities such as burning of fossil fuels and deforestation, are heating the globe and driving climate change and instability. The impacts of these changes are already damaging infrastructure, natural and social systems – including cultural heritage – that provide essential benefits and quality of life to communities.

The loss and damage to tangible and intangible cultural heritage, including heritage places and practices represents a trauma to cultures and communities, and a loss to humanity. While mitigation remains the most effective means of reducing loss and damage, adaptation activities can help protect sites from many of the impacts of climate change. There is a need for the heritage sector to better understand, plan for and implement these measures at site, regional, national and international levels.

The heritage sector has immense potential to contribute to societal climate change adaptation, as indicated within the Paris Agreement, which states that adaptation action should be based on and guided by the best available science and, as appropriate, traditional knowledge, knowledge of indigenous peoples and local knowledge systems (Article 7.5, 2015).

Case Study: Ruins of Kilwa Kisiwani and Ruins of Songo Mnara Tanzania

The Ruins of Kilwa Kisiwani and Ruins of Songo Mnara World Heritage Site is an archaeological and historical site of 9th – 19th Centuries inscribed in the World Heritage List, under criteria III which recognizes the site as "bearing a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared." Impacts related to climate change are being caused by strong wave action, high tides, wind and rainwater.

These have mostly affected the ruins found along the coastal areas. For example, sea waves and tides cause erosion to the monuments located close to the ocean edge including Gereza/Portuguese Fort, Husuni Kubwa Palace, cemeteries and Malindi Mosque as Well as Makutani Palace while rainwater has caused erosion of the monuments surfaces. In response the site management have taken the following adaptation actions:

I. Plantation of mangrove trees in open areas close to the ruins along the coastal edge. This nature base solution will slow erosion by dissipating wave action and encouraging sedimentation. Photo by Mercy Mbogelah

II. Construction of a Gabion wall at Husuni Kubwa Palace to prevent erosion of a cemetery below the mosque. Photo by Mercy Mbogelah

Case Study: Example of Climate Change Adaptation through community activity in a section of the Qhapac Ñan, Peru.

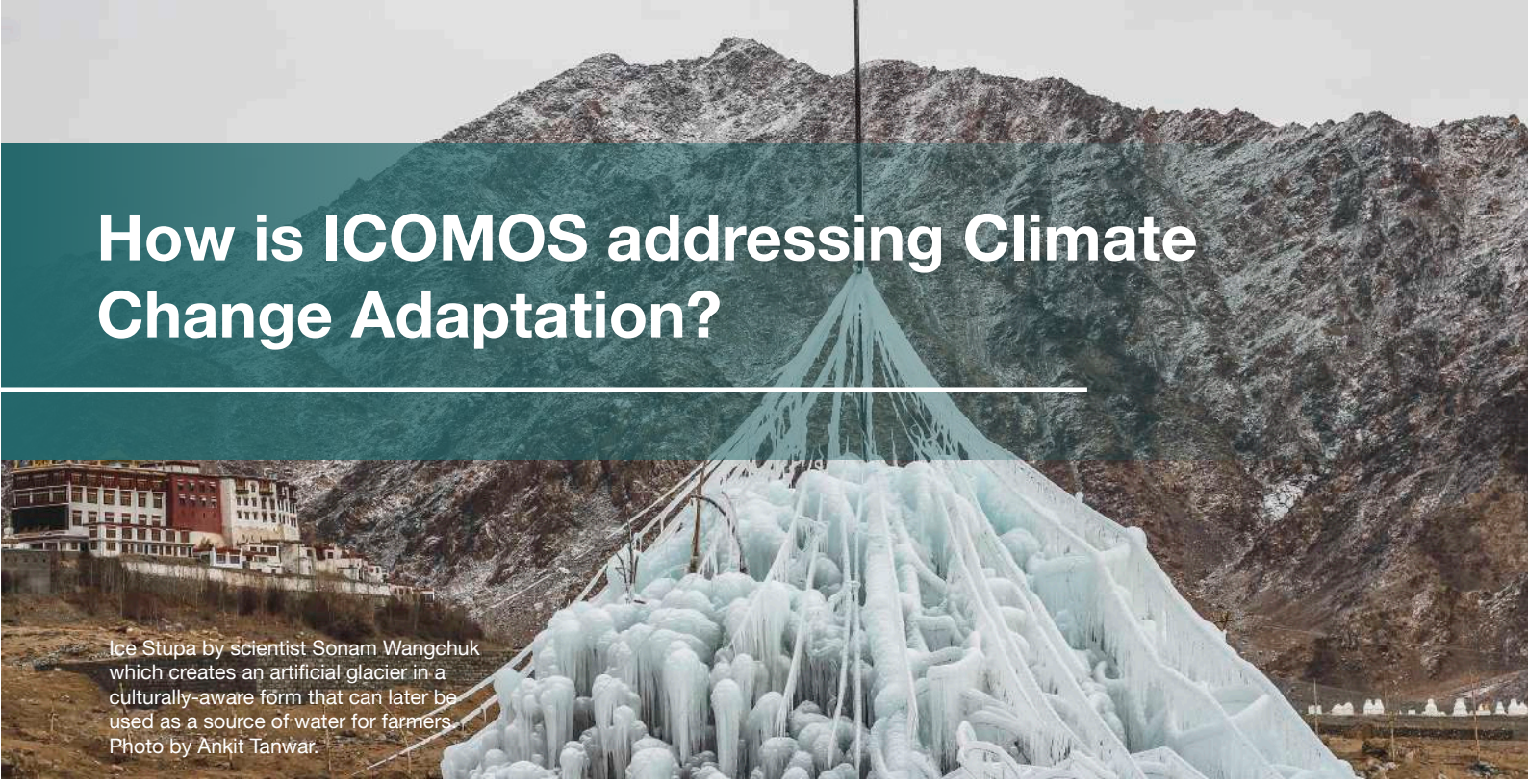
The Inca Trail, or Qhapac Ñan, has been inscribed on the World Heritage List since 2014, is a living trail and retains an exceptional relationship with the 319 communities that are in its environment. They are particularly vulnerable to extreme rains, floods and landslides. Also to temperature changes, which will affect crops.

Once a year in the Tambillos ravine, Ancash, the "Naani Aruy" is celebrated. This is an ancestral celebration for the maintenance of the roads in which the entire community participates. The conservation work is organized through a communal assembly where they decide as a group what maintenance activities will be carried out.

This ancestral tradition is a representative example of Adaptation to climate change, which has demonstrated for many centuries how communities organize themselves for the maintenance and conservation their road.

Traditional conservation of the Qhapac Ñan Photos by Ricardo Chirinos Portocarrero.

How is ICOMOS addressing Climate Change Adaptation?



Ice Stupa by scientist Sonam Wangchuk which creates an artificial glacier in a culturally-aware form that can later be used as a source of water for farmers. Photo by Ankit Tanwar.

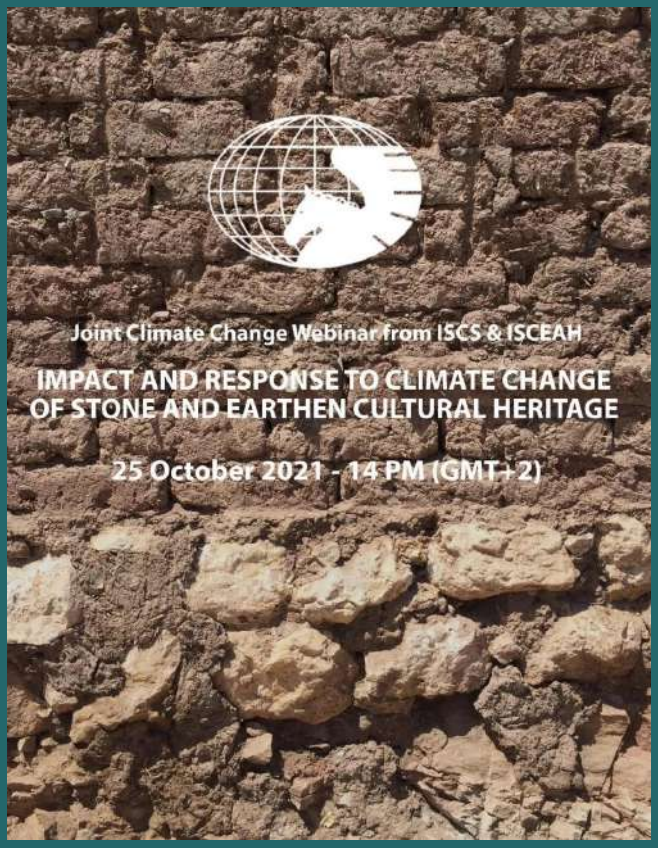
ICOMOS has been at the forefront of climate action within the heritage sector and its efforts have repeatedly emphasised the importance of sustainable adaptation. This resource is an extension of our work to date and focuses exclusively on issues of adaptation to climate change. Specific previous actions include:

- ICOMOS Resolution 20GA/15 declared a Climate and Ecological Emergency and called for *'heightening the ambition and capacity of communities to act, **supporting climate adaptation** and resilience, contributing to mitigation interventions to reduce GHG emissions, and addressing loss and damage from climate impacts'.*
- ICOMOS Resolution 20GA/19 declares that People-Centred Approaches to Cultural Heritage are to be promoted so that the diverse cultural, environmental, and socio-economic concerns of people and communities are taken into account when local, national and international heritage policies and practices are developed….
- The ICOMOS Future of our Pasts report notes that The heritage sector has immense potential to contribute to societal climate change adaptation as indicated within the Paris Agreement, which states that adaptation action should be based on and guided by the *best available science and, as appropriate, traditional knowledge, knowledge of indigenous peoples and local knowledge systems* (Article 7.5, 2015).
- The ICOMOS Advisory Committee and the Scientific Council 2021 unanimously resolved to adopt the Triennial Scientific Plan 2021-2024 Cultural Heritage and Climate Action, recognising the engagement of all ICOMOS national and scientific committees and Working Groups to actively support the Climate Action Working Group in its implementation, through a resource portal and capacity building plan. This is the first time ICOMOS has harnessed the energies and commitment of all 10,000+ members on a single issue: climate change action.
- Adaptation efforts should be values-led and community driven, reflecting and understanding that the, *'Conservation of a place should identify and take into consideration all aspects of cultural and natural significance without unwarranted emphasis on any one value at the expense of others'* (The Burra Charter, Article 5.1).

How is ICOMOS addressing Climate Change Adaptation?

Case Study: Sharing knowledge and increasing capacity, Webinar for members of ICOMOS ISCS and ISCEAH.

A Joint Climate Change Webinar was organized in October 2021 by the ICOMOS International Committee of Stone (ISCS) in conjunction with the ICOMOS International Scientific Committee on the Conservation of Earthen Architectural Heritage (ISCEAH). Webinar title: “Impact and response to climate change of stone and earthen cultural heritage.” There were 9 presentations and 34 participants from both ISCs showcasing various climate related activities in the countries represented. Further information can be found at: isceah.icomos.org and the webinar can be found at https://www.youtube.com/watch?v=6FzP5mBYEhU



What can we do now?

Legacy Indicator Tool for understanding long term impacts of climate change on stone, Skellig Michael. Photo by Cathy Daly 2020

Vulnerability to the impacts of climate change depends on exposure, sensitivity, and adaptive capacity and deliberate efforts to increase the capacity to cope with (or avoid) the impacts of climate change are now needed. Climate adaptation planning and policy can happen at all scales, and adaptation actions can include both individual and collective measures.

1 Increasing knowledge, understanding and capacity

Adaptation starts with understanding the problem and building capacity. Cultural heritage practitioners need to acquire an understanding of climate change in order to factor it into their decision making, e.g. through carrying out "Climate Risk Assessments" on all cultural heritage assets.

Practitioners should also reach out to other sectors, and the public, in communicating about the risks of climate change and on heritage based solutions. For example by highlighting the links between nature and culture, and the sustainability of many historic, traditional and indigenous practices.

Collaboration with other sectors and with local communities in combining place-based knowledge with an interdisciplinary approach to designing solutions is the best way to avoid maladaptation. Maladaptation is when adaptation policy or actions have an unforeseen negative consequence, either now or in the future, and can occur within the same or different sectors/social groups. Indigenous and local knowledge should be combined with best available science in adaptation planning and decision-making.

What can we do now?

2 Building resilience

Climate change is a risk multiplier that can exacerbate current hazards, exposures and vulnerabilities.

Effectively addressing non-climate threats can help to build resilience to climate change and improve adaptive capacity. Monitoring, regular maintenance, disaster preparedness and visitor management are examples of so-called win-win solutions, i.e. actions that both help to improve the current condition of heritage and increase their resilience to climate hazards.

Heritage also has the potential to contribute to social resilience via sustainable development and the recovery from climate change through providing people with a sense of place, identity and livelihood.

3 Preparing for change

Modern conservation practice recognises that all places and their components change over time at varying rates (Burra charter, ICOMOS, 1999: 1.6). The potential effects of rapid global climate change will require flexibility in the sector's approach to what 'acceptable change' and authenticity mean (figure 1). Negotiated place based solutions that focus on maximising the conservation of values must be at the centre of this process.

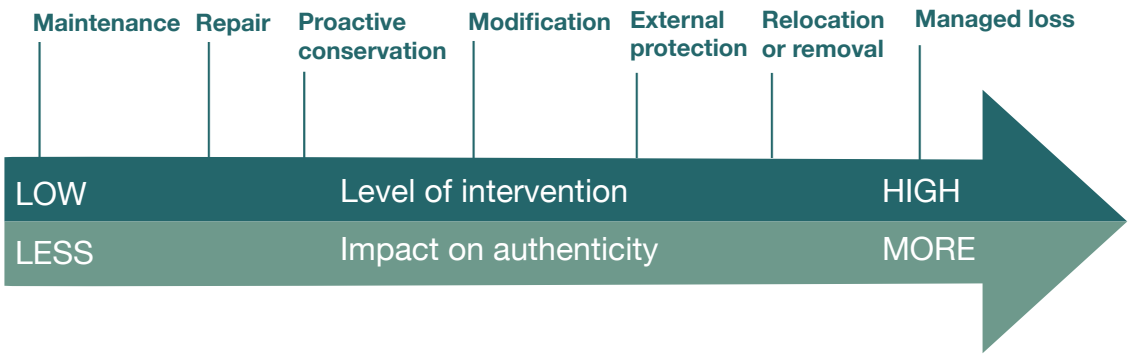


Figure 1. Conceptual relationship between different levels of adaptive intervention and the authenticity of heritage resources (Graphic by Chan, C. 2018. Adapted from Historic Environment Group, 2018, p11, figure 3)

Case study: Evolving flood defences, Ayutthaya, Thailand

In 2011 Ayutthaya World Heritage Park was submerged by severe flooding, with over 150 historic monuments affected. As a result permanent 3m flood defence walls were built and further mixed measures to protect archaeological sites (embankments, temporary flood walls etc.) were implemented. To date flood defences have therefore mainly relied on grey infrastructure which is costly to maintain and also fails to cope with increasingly unpredictable flood levels. In addition, while often effective at protecting the site, the defences act to channel the water elsewhere, resulting in conflict between the heritage site management team and surrounding communities.

The historic city fabric of Ayutthaya was crisscrossed by a network of canals enabling inhabitants to live with water and manage natural flood events. Over time however a great number of the canals fell into disuse resulting in a loss of spaces for retaining floodwater. The updated strategy combines restoration and maintenance of the ancient flood relief canals with the additional modern flood defences together with water management. This integrated and interdisciplinary approach that includes nature-based solutions and community participation will increase Ayutthaya's climate change resilience.

Flood wall concealed as a waterside walkway at Wat Chaiwatthanaram. Photo by Witiya Pittungnapoo, Nov 2020

Case Study: Engineered solutions providing immediate but reversible adaptation, sheltering the Megalithic Temples of Malta (UNESCO World Heritage Sites)

The Maltese Megalithic Temples, constructed between the mid-fourth and mid-third millennia BC, are unique and are amongst the oldest stone buildings of such complexity in the world. They are of great local and international significance, embodying symbolic, educational and recreational values. These free-standing Temples have been suffering from a series of severe problems associated with the deterioration of materials (limestone) as well as structural problems, seen in a number of serious collapses over the years. These vulnerable prehistoric structures have been protected from the direct impact of environmental factors by means of a temporary, open-sided shelter, conceived as a large parasol designed to be as light as possible, in visual as well as in physical terms.

Ħaġar Qim Megalithic Temples and Mnajdra Archaeological Park - Photo from Heritage Malta

What can we do now?

4 Preparing for loss

The triage approach to adaptation decision making suggests categorising heritage assets as follows:

1. Heritage that may be saved by forward planning and an interdisciplinary approach to adaptation action,
2. Heritage that must be saved if at all possible, perhaps requiring new approaches,
3. Doomed heritage where loss is inevitable.

Preparing for loss is part of adaptation planning, and should be given careful attention. Decisions on allowing loss to occur must be clearly communicated to stakeholders and appropriate responses developed in conjunction with local communities.

Professional techniques such as documentation, archaeological excavation, interpretation and oral history recording could be combined with community designed memorialisation activities to conserve as much value as possible. The imminent loss of sites may provide opportunities for research and community engagement which may in fact create new values. Deciding which sites are let go, where to invest in conservation and the loss of the sites themselves may also cause conflict however, and mediation will need to be part of this process. It is important to note that losses will not only be site-based, but may include intangible heritage such as seasonal traditions, foodways and language elements.

Case study: Ancient strategies for managing climatic risks in Tchogha Zanbil World Heritage Site in Iran

Archaeological sites have experienced and survived a wide range of extreme weather events in the past, and this resilience could be demonstrated in the future as well. Palaeoclimatic studies demonstrate that climates have changed since ancient times and the history of archaeological sites has often been closely tied to climate change and human-environment interactions, which can in turn be directly analysed through archaeological records. Sites can therefore reveal past weather conditions and provide information on past adaptations to natural events. For example, in Tchogha Zanbil (Iran), the ancient builders used various water management strategies, such as a stepped drainage system based on the inlet/outlet capacity of gutters, putting up a brick façade over the adobe structure, directing the water into the lowest points by gutters and ceramic channels, using natural bitumen in moisture-prone places and collecting disposal water or rainwater in wells.

Drainage System in the Tchogha Zanbil ziggurat (2nd millennium BC). Photo by Masoud Nakhaei, 2015.

Case Study: Bawinanga, Australia

The Djelk Indigenous Protected Area (IPA) in northern Australia contains records of habitation stretching back 50,000 years, and rock art that depicts hunting, gathering, societal structure and rituals from 28,000 years ago to the present.

In 2017 the Bawinanga Rangers, directed by an Indigenous executive committee and employing mostly traditional landowners, wrote a Cultural Site Adaptation Plan for the IPA. Rangers had already perceived what they identified as climate change impacts and the plan sought to address these. Impacts included coastal erosion from sea level rise and increased storm surge, and inland erosion from more intense precipitation events.

Bawinanga rangers conduct risk analysis for coastal middens. Photo by Bethune Carmichael

After scoping their Plan, rangers devised and used a novel risk assessment method that evaluated risk via exposure, sensitivity, and significance parameters. They subsequently developed and tested a participatory decision-making approach that allowed them to identify and appraise adaptation actions for inclusion in the Plan. The adaptation planning process was undertaken in partnership with a researcher from the Australian National University, who facilitated rangers conducting the research and risk assessments. All the resulting data for the Plan remains in the possession and control of the rangers (Carmichael et al 2020).

The Adaptation Plan focussed on increasing ranger capability and capacity. It prioritised training in rock art conservation, to build site resilience, and in the use of the risk assessment tool. It also planned the development of a digitalised version of the tool for use on ranger tablets. It also acknowledged that sites would inevitably be lost or damaged. At these sites, documentation is essential before loss takes place. Rangers planned to develop a process for routinely making 3D models of sites and the incorporation of these models into augmented reality software. They envisaged the visualisation of lost or damaged sites via augmented reality ocular headsets at the actual site of loss.

What can we do now?

5 Being part of the solution

The root cause of the climate crisis is human behaviour, yet there are many sustainable contemporary and historic ways of being and living which cultural-custodians can evidence as society transitions to a low carbon future. For example, many traditional and historic water management practices may provide lessons for the development of effective adaptation strategies.

While offering culture-based adaptation solutions, practitioners must also ensure that actions for heritage do not contribute to greenhouse gas emissions. This means avoiding maladaptation, and actively seeking low carbon and environmentally sustainable solutions such as those provided by many traditional locally sourced materials.

The sector must model best practice, reducing energy usage and favouring nature based approaches where possible.

Case Study: Sustainable conservation management, Parques de Sintra Portugal: Increasing the Resilience of Natural and Built Heritage

Parques de Sintra manages approximately 1000 hectares of forest, integrated in the Sintra Cascais Natural Park and in the Sintra Cultural Landscape, classified by UNESCO as World Heritage. Its management actions contribute to the valuation and conservation of ecosystems and habitats, as well as the built heritage, promoting the reduction of energy consumption, and sustainable actions to increase resilience to climate change. The Multi-Year Building Management Plan establishes the conservation and maintenance strategy for the five-year period which, together with periodic maintenance and routine inspections, ensures significant reduction of investment costs and the need for deep interventions - effectively promoting the sustainable conservation of the building.

Sustainable conservation measures taken include:

Maintenance action with the use of lime. Photo by Parques de Sintra, Monte da Lua.

- reuse of waste
- use of natural materials in construction and restoration
- use of low-energy consuming materials

Energy, water and material efficiency was increased by applying measures such as: More efficient lighting equipment, reduction of hours of outdoor lighting, timed taps, and rehabilitation of the water supply mines network, among others. By 2024 the measures developed will result in a reduction of 52.5 tonnes of oil equivalent/ year (21.86%); 13,368.10m3 of water (26.01%), and a reduction of 28.08% of greenhouse gas emissions.

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Flooding in the historic city of York. Photo by Dimitar Zhekov.

Contributors

Cathy Daly	ICOMOS Ireland / CAWG
Will Megarry	CAWG and ICAHM
JoAnn Cassar	ICOMOS Malta and ISCS
Bethune Carmichael	ICOMOS Australia
Ricardo Chirinos Portocarrro	Co-coordinador de la Unidad de Gestión y Supervisión de Áreas Declaradas Patrimonio de la Humanidad en Perú
Carmen Daly	ICOMOS VP Americas / CAWG
John Hughes	President ISCS
Mercy Mbogelah	Site Manager Ruins of Kilwa Kisiwani and Ruins of Songo Mnara
Masoud Nakhaei	ICOMOS-ISCEAH chair of archaeology
Esmeralda Paupério	ICOMOS Portugal
Witiya Pittungnapoo	ICOMOS Thailand
João Sousa Rego	Parques de Sintra, Portugal
Sheridan Burke	ICOMOS Australia /CAWG/ACO/ ISC20C
Peter Cox	ICOMOS Ireland / CAWG
Roger-Alexandre Lefevre	ICOMOS France
Adam Markham	ICOMOS USA/ CAWG
Cecilie Smith-Christensen	ICOMOS Norway / SCTF

Designed by: Lydia Loopesko